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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/577,630

04/28/2006

Rongzhen Yang

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INTEL/BSTZ

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EXAMINER

PATEL, HETUL B

ART UNIT

PAPER NUMBER

2186

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/577,630	<b>Applicant(s)</b> YANG, RONGZHEN	
	<b>Examiner</b> HETUL PATEL	<b>Art Unit</b> 2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/08/2006</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Claims 1-23 are presented for examination.

#### ***Priority***

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

#### ***Information Disclosure Statement***

3. The information disclosure statement (IDS) submitted on 12/08/2006 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner.

#### ***Specification***

4. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claims 3, 5, 10, 12, 14, 19, 20 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3, 5, 10, 12, 14, 19, 20 and 22 recite the limitation "the virtual address" in them. There is insufficient antecedent basis for this limitation in these claims.

***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 21-23 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. According to page 19, lines 7-9 of the specification of the current application, claims 21-23 are directed to an article of manufacture having a machine-readable medium including propagated signals such as electrical, optical, acoustical or other forms of propagated signals (e.g., carrier waves, infrared signals, digital signals, etc.). This subject matter does not fall within a statutory category of invention because it is neither a process, machine, manufacture, nor a composition of matter. Instead, it is directed to a form of energy. Forms of energy do not fall within a statutory category since they are clearly not a series of steps or acts to constitute a machine, not a tangible physical article or object which is some form of matter to be a product and constitute a manufacture, and not a composition of two or more substances to constitute a composition of matter.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-3, 8-12, 17-19 and 21-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Mallick (USPN: 5,953,520).

As per claim 1, Mallick teaches a method, comprising: receiving a virtual page number lookup request at a virtual Translation Lookaside Buffer (TLB) (i.e. receiving logical (effective) address at the MMUs 56 and 58 in Fig. 2), wherein the virtual TLB (i.e. the combination of ITLB and DTLB, 59 and 57 in Fig. 2) includes an instruction TLB (59 in Fig. 2) and a data TLB (57 in Fig. 2); performing a lookup of the virtual page number in the virtual TLB; and returning a physical page number corresponding to the virtual page number in the virtual TLB (i.e. if miss occurs, then an exception is taken and the page table is searched for the matching PTE; see Col. 12, line 21 - Col. 13, line 7 and Fig. 2).

As per claim 2, Mallick teaches the claimed invention as described above and furthermore, Mallick teaches that performing the lookup of the virtual page number includes performing the lookup of the virtual page number in the instruction TLB and the data TLB simultaneously (see Col. 12, lines 44-55).

As per claims 9-11, 17 and 21, refer rejection of claims 1-2. Claims 9-11, 17 and 21 are also rejected based on the same rationale as the rejection of claims 1-2.

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As per claims 3, 12, 18-19 and 22, Mallick teaches the claimed invention as described above and furthermore, Mallick teaches about performing a page table lookup if the virtual address is not found in the virtual TLB (i.e. if miss occurs, then an exception is taken and the page table is searched for the matching PTE; see Col. 13, lines 2-7).

As per claim 8, Mallick teaches the claimed invention as described above and furthermore, Mallick teaches that the virtual page number lookup request is received from one of a Data Memory Management Unit (DMMU) or an Instruction Memory Management Unit (IMMU) (see Col. 12, lines 37-40).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 4-7, 13-16, 20 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mallick in view of Augsburg et al. (USPN: 2007/0094476) hereinafter, Augsburg.

As per claims 4 and 5, Mallick teaches the claimed invention as described above. However, Mallick does not disclose about updating the virtual TLB with the virtual page number and a corresponding physical page number resulting from the page table lookup, wherein updating the virtual TLB includes: updating the data TLB if a physical address corresponding to the virtual address has stored data; and updating the

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instruction TLB if the physical address corresponding to the virtual address has stored an instruction. Augsburg, on the other hand, teaches about having multiple TLBs and also separate ITLB and DTLB; and when the desired virtual address generates TLB miss, both upper and lower TLBs are updated with the new address information retrieved from the page table (see paragraph [0004] and the abstract).

As per claims 13-14, 20 and 23, refer rejection of claims 4 and 5. Claims 13-14, 20 and 23 are also rejected based on the same rationale as the rejection of claims 4 and 5.

As per claims 6 and 15, the combination of Mallick and Augsburg teaches the claimed invention as described above, but failed to specifically disclose about using a round robin algorithm to update the virtual TLB. Updating TLB using different algorithms such as LRU, MRU, FIFO, round-robin etc. Further, neither Applicant nor the specification disclose that using a round robin algorithm to update the virtual TLB as claimed here is critical, i.e. neither Applicant nor the specification disclose that by updating the virtual TLB differently would downgrade the functionality or performance of the cache memory of the claimed method and apparatus. Therefore, updating the virtual TLB as claimed is considered to be an obvious matter of design choice.

As per claims 7 and 16, the combination of Mallick and Augsburg teaches the claimed invention as described above and furthermore, Augsburg teaches that the page table lookup is performed by an operating system (see paragraphs [0002] and [0023]).

***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HETUL PATEL whose telephone number is (571)272-4184. The examiner can normally be reached on 8:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hetul Patel/  
Patent Examiner  
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